AMENDMENTS TO THE CLAIMS:

1. (Currently amended) A method to at least one of reduce a memory space requirement and to increase a processing efficiency in a computerized method of linear algebra processing, said method comprising:

providing a hybrid full-packed data structure for processing ~~a matrix~~ data of a triangular ~~packed format~~ matrix ~~in at least~~ by one or more dense linear algebra (DLA) matrix subroutines designed to process matrix data in a full format~~, using a hybrid full-packed data structure~~, as modified to process matrix data using said hybrid full-packed data structure,

wherein said hybrid full-packed data structure provides a rectangular full format data structure for an entirety of said triangular ~~packed~~ matrix data and said triangular matrix comprises a triangular or symmetric/Hermitian matrix.

2. (Currently amended) The method of claim 1, further comprising:

converting said matrix data from said triangular ~~packed~~ format into said hybrid full-packed data structure or vice-versa.

3. (Currently amended) The method claim 1, wherein said hybrid full-packed data structure comprises:

a square portion of said triangular ~~packed~~ matrix data;

a first triangular portion of said triangular ~~packed~~ matrix data; and

a second triangular portion of said triangular ~~packed~~ matrix data,

wherein said square portion, said first triangular portion, and said second triangular portion are fitted together to form said rectangular data structure.

4. (Currently amended) The method of claim 1, wherein said ~~at least one~~ matrix subroutine designed to process matrix data in said full format comprises ~~at least one of a packed triangular matrix subroutine and a symmetric~~ a matrix subroutine of a LAPACK (Linear Algebra PACKage) software package.

5. (Currently amended) The method of claim 4, wherein said ~~at least one~~ matrix subroutine comprises a variant of a corresponding full format routine of a ~~LAPACK~~ level 3 BLAS (Basic Linear Algebra Subroutine).

6. (Original) The method of claim 5, wherein said level 3 BLAS comprises an L1 kernel routine,

wherein L1 comprises an L1 cache in a computer, said L1 cache comprising a cache closest to one of a CPU (Central Processing Unit) and an FPU (Floating-Point Processing Unit) in said computer.

7. (Currently amended) The method of claim 2, wherein said converting comprises:

determining a portion of said triangular matrix data ~~stored in said triangular packed format~~ that would comprise a square portion having a dimension approximately one half a dimension of said triangular ~~packed format~~ matrix data.

8. (Currently amended) The method of claim 7, further comprising:

fitting a first triangular portion of said triangular matrix data ~~stored in said triangular packed format~~ into a first location relative to data of said square portion; and

fitting a second triangular portion of said triangular matrix data ~~stored in said triangular packed format~~ into a second location relative to data of said square portion,

wherein said first triangular portion, said second triangular portion, and said square portion fit together to form said rectangular data structure.

9. (Canceled)

10. (Currently amended) An apparatus for linear algebra processing, said apparatus comprising:

a processor for processing a matrix data of a triangular ~~packed format~~ matrix in at least one dense linear algebra (DLA) matrix subroutine designed to process matrix data in a full format, using a hybrid full-packed data structure, said DLA matrix subroutine having been modified to process matrix data using said hybrid full-packed data structure,

wherein said hybrid full-packed data structure provides a rectangular data structure for an entirety of said triangular ~~packed~~ matrix data and said triangular matrix comprises a triangular or symmetric/Hermitian matrix.

11. (Currently amended) The apparatus of claim 10, further comprising:

a receiver for receiving said triangular matrix data ~~in said triangular packed format~~, said processor further converting said triangular matrix data ~~received in said triangular packed format~~ into said hybrid full-packed data structure or vice-versa.

12. (Currently amended) The apparatus of claim 10, wherein said hybrid full-packed data structure comprises:

a square portion of said triangular ~~packed~~ matrix data;

a first triangular portion of said triangular ~~packed~~ matrix data; and

a second triangular portion of said triangular ~~packed~~ matrix data,

wherein said square portion, said first triangular portion, and said second triangular portion are fitted together to form said rectangular data structure.

13. (Currently amended) The apparatus of claim 10, wherein said at least one matrix subroutine designed to process matrix data in a full format comprises at least one level 3 BLAS (Basic Linear Algebra Subroutine) or a matrix subroutine of a LAPACK (Linear Algebra PACKage) or a comparable software package.

14. (Original) The apparatus of claim 13, wherein said processor comprises one of a CPU (Central Processing Unit) and an FPU (Floating-Point Processing Unit), said apparatus further comprising:

an L1 cache, said L1 cache comprising a cache closest to said CPU or said FPU,

wherein said level 3 BLAS comprises an L1 kernel routine.

15. (Currently amended) A signal-bearing medium tangibly embodying a program of machine-readable instructions executable by a digital processing apparatus to perform a method of processing a triangular matrix data ~~of a triangular packed format matrix~~ in at least one matrix subroutine, using a hybrid full-packed data structure,

wherein said hybrid full-packed data structure provides a rectangular data structure for an entirety of said triangular ~~packed~~ matrix data and said triangular matrix comprises a triangular or symmetric/Hermitian matrix.

16. (Currently amended) The signal-bearing medium of claim 15, said machine-readable instructions further comprising instructions to convert said triangular matrix data ~~from said triangular packed format~~ into said hybrid full-packed data structure or vice-versa.

17. (Currently amended) The signal-bearing medium of claim 15, wherein said hybrid full-packed data structure comprises:

a square portion of said triangular ~~packed~~ matrix data;

a first triangular portion of said triangular ~~packed~~ matrix data; and

a second triangular portion of said triangular ~~packed~~ matrix data,

wherein said square portion, said first triangular portion, and said second triangular portion are fitted together to form said rectangular data structure.

18. (Currently amended) A method of at least one of solving and applying a scientific/engineering problem, said method comprising at least one of:

using a dense linear algebra (DLA) software package that computes one or more matrix subroutines, wherein said linear algebra software package processes a matrix data of a triangular ~~packed~~ matrix format matrix ~~in at least one matrix subroutine~~, using a full-packed data structure, in at least one full-format matrix subroutine, as modified to use said full-packed data structure,

wherein said hybrid full-packed data structure provides a rectangular data structure for an entirety of data of a triangular matrix ~~stored in said triangular packed data~~, said rectangular data structure allowing said triangular ~~packed~~ data to be stored in a smaller memory space and allowing said processing to execute more efficiently;

providing a consultation for solving a scientific/engineering problem using said linear algebra software package;

transmitting a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed version representing said result; and

receiving a result of said linear algebra software package on at least one of a network, a signal-bearing medium containing machine-readable data representing said result, and a printed version representing said result.

19. (Currently amended) The method of claim 18, wherein said linear algebra software package comprises a Linear Algebra PACKage (LAPACK) or comparable software package.

20. (Currently amended) The method claim 18, wherein said hybrid full-packed data structure comprises:

a square portion of said triangular ~~packed~~ matrix data;

a first triangular portion of said triangular ~~packed~~ matrix data; and

a second triangular portion of said triangular ~~packed~~ matrix data,

wherein said square portion, said first triangular portion, and said second triangular portion are fitted together to form said rectangular data structure.

21. (Currently amended) A computerized method of converting data in a triangular matrix into a rectangular data format, said method comprising:

determining a portion of said matrix data stored in said triangular packed format that would comprise a square portion having a dimension approximately one half a dimension of an entirety of said data stored in said triangular packed format;

fitting a first triangular portion of said matrix data stored in said triangular packed format into a first location relative to data of said square portion; and

fitting a second triangular portion of said matrix data stored in said triangular packed format into a second location relative to data of said square portion,

wherein said first triangular portion, said second triangular portion, and said square portion fit together to form said rectangular data structure.

22. (Canceled)

23. (Currently amended) A data structure in a computer program used for processing matrix data, said data structure used to store a matrix data from a triangular matrix format, said data structure providing a rectangular structure for said data from said triangular matrix, said data structure comprising:

a first portion forming a square portion, said square portion including said triangular matrix data ~~stored in said triangular packed format~~ that would comprise a square portion having a dimension approximately one half a dimension of said triangular ~~packed format~~ matrix data;

a second portion forming a first triangular portion, said first triangular portion including a first triangular matrix data ~~stored in said triangular packed format~~ that remains after ignoring said square portion ~~is eliminated~~; and

a third portion forming a second triangular portion, said second triangular portion including a second triangular matrix data ~~stored in said triangular packed format~~ that remains after ignoring said square portion and said first triangular portion~~s are eliminated~~,

wherein said data structure fits together said first portion, said second portion, and said third portion to form a rectangular data structure for an entirety of said triangular matrix data and said triangular matrix comprises a triangular or symmetric/Hermitian matrix.

24. (Original) A method of providing a service, said method including at least one of:

at least one of solving and applying a scientific/engineering problem in accordance with the method of claim 18; and

providing a consultation using a method in accordance with claim 18.

25. (Canceled)

26. (New) The method of claim 1, wherein said triangular matrix data comprises matrix data in a triangular packed format, said hybrid full-packed data structure thereby allowing a faster processing using a modified full format DLA matrix subroutine than is possible using a packed format DLA matrix subroutine.

27. (New) The method of claim 1, wherein said triangular matrix data comprises matrix data in a triangular full format, said hybrid full-packed data structure thereby allowing a reduction in required memory space by about 100% compared to said triangular full format data.

28. (New) The method of claim 26, said hybrid full-packed data structure thereby providing a means to eliminate a necessity that processing triangular matrix data in a packed format must be executed by slower DLA subroutines designed for said packed format.